

METHOD AND APPARATUS FOR ECONOMICAL DRIFT COMPENSATION IN HIGH RESOLUTION MEASUREMENTS

ABSTRACT OF THE DISCLOSURE

A system for measuring differences in a physical variable, such as temperature or
5 voltage, by utilizing predictable behavior in the relative drift over time of reference curves
representative of offset, and other measurement parameters for various circuit elements,
including, for example, two sensors coupled to a difference signal amplifier, the difference
signal amplifier, an ambient condition amplifier, and an analog to digital converter. In an
initial calibration mode, the system records several reference curves, stored in memory,
10 correlating ambient condition measurements to offset, and, optionally, other parameter
measurements acquired from the difference signal amplifier and the ambient condition
amplifier. Offset and other reference curves recorded in the initial calibration mode,
correlating ambient condition measurements to measurements, or values derived from
measurements, from the difference signal amplifier, typically include one curve recorded
15 with both inputs of the difference signal amplifier held at equal potential and another
curve recorded with both sensors held at the same value of the physical variable, over a
given ambient condition range. Another reference curve representative of offset correlates
ambient condition to measurements from the ambient condition amplifier, with inputs to
the ambient condition amplifier connected to a system ground, or substantially time stable
20 reference potential. These reference curves representing drift behavior, among electrical
components, can be updated for time drift at a single, current arbitrary ambient
temperature, the measurements for which can be obtained quickly and applied as a time
drift correction to the reference curves, without interrupting normal system operation, to

provide a compensated difference measurement between the different values of the physical variable measured by the respective sensors. Additionally, the system dynamically tracks cumulative system errors, in order to calculate optimal system resolution, based upon current operating conditions.